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(54) POLYOLEFIN-BASED FILM FOR STRETCH PACKAGING

(57)Abstract:

PROBLEM TO BE SOLVED: To provide nonchlorine-type stretch film having good workability and finish in packaging and also excellent in storage stability and economic efficiency.

SOLUTION: This polyolefin-based film for stretch packaging has at least one layer where the stereoregularity of a soft polypropylene-based resin having crystalline blocks and amorphous ones in its molecular chain in a coexisting state is controlled and the resin is included as a principal ingredient. And the film has 5.0×10^8 dyn/cm²– 5.0×10^9 dyn/cm² storage elasticity (E') and (0.2–0.8) loss tangent (tan δ) respectively according to dynamic viscoelastic measurement at a frequency of 10 Hz and 20° C.

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CLAIMS

[Claim(s)]

[Claim 1] It is the elasticity polypropylene resin by which a crystalline block and the stereoregularity in which the block part of amorphism nature is intermingled were controlled in the chain. It has further at least the layer which uses as a principal component the resin with which are satisfied of the conditions of following the (1) - (3). The storage modulus (E') measured at the frequency of 10Hz and the temperature of 20 degrees C by dynamic viscoelasticity measurement 5.0×10^8 dyn/cm² - 5.0×10^9 dyn/cm², The film for polyolefine system stretch packaging characterized by a loss tangent ($\tan \delta$) being in the range of 0.2-0.8.

The glass transition temperature measured when a temperature up is carried out by part for heating rate/of 10 degrees C using a differential scanning calorimeter uses -15-degree-C or more (2) differential scanning calorimeter. By part for heating rate/of 10 degrees C (1) After crystal fusion, the amount of heat of crystallization measured when the temperature is lowered to a room temperature by part for cooling rate/of 10 degrees C, after carrying out the temperature up to 200 degrees C and holding for 5 minutes at 200 degrees C -- 10 - 60 J/g (3) melt flow rate (MFR) (JISK7210 -- 230 degrees C) 2.16kg load is [Claim 2] 0.4-40g / ten parts. the monomeric unit based on a propylene in the elasticity polypropylene resin by which the stereoregularity to which the crystalline block and the block part of amorphism nature are intermingled was controlled in the chain -- more than 95 mol % -- the film for polyolefine system stretch packaging according to claim 1 characterized by the sum (mmmm+rrrr) of the meso pentad molar fraction which contains and is called for from ¹³C-NMR spectrum, and a racemo pentad molar fraction being in 30 - 70% of range.

[Claim 3] The film for polyolefine system stretch packaging according to claim 1 to 2 characterized by the sum (mmmm+rrrr) of 25 - 50% and a meso pentad molar fraction, and a racemo pentad molar fraction having the meso pentad molar fraction (mmmm) called for from 13 C-NMR spectrum of the elasticity polypropylene resin by which a crystalline block and the stereoregularity in which the block part of amorphism nature is intermingled were controlled in the chain in 40 - 65% of range.

[Claim 4] The storage modulus (E') measured at the frequency of 10Hz and the temperature of 0 degree C by dynamic viscoelasticity measurement is 1.5×10^{10} dyn/cm². Film for polyolefine system stretch packaging according to claim 1 to 3 characterized by being in the following range.

[Claim 5] The film for polyolefine system stretch packaging according to claim 1 to 4 characterized by mixing the following (B) component in the layer which uses as a principal component the elasticity polypropylene resin by which the stereoregularity in which the crystalline block and the block part of amorphism nature are intermingled was controlled in the chain.

(B) Petroleum resin, terpene resin, coumarone-indene resin, rosin system resin, or those hydrogenation derivatives [claim 6] a chain -- inside -- crystallinity -- a block -- amorphism -- a sex -- a block -- a part -- being intermingled -- **** -- stereoregularity -- controlling -- having had -- elasticity -- a polypropylene resin -- a principal component -- ** -- carrying out

-- a layer -- glass transition temperature -- 50 - 100 -- degree C -- it is -- (-- B --) -- a component -- 20 -- % of the weight -- less than -- the range -- mixing -- things -- the description -- ** -- carrying out -- being according to claim 5 -- polyolefine -- a system -- stretch packaging -- ** -- a film .

[Claim 7] The film for polyolefine system stretch packaging according to claim 1 to 6 characterized by a vinyl acetate content becoming both sides of the layer which uses as a principal component the elasticity polypropylene resin by which the stereoregularity in which the crystalline block and the block part of amorphism nature are intermingled was controlled in the chain from the film which carried out the laminating of the layer to which a melt flow rate (JISK7210, 190 degrees C, 2.16kg load) uses the ethylene-vinylacetate copolymer for 0.2-5g / 10 minutes as a principal component at 5 - 25 % of the weight.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the stretch film used suitable for food packing, especially the film for stretch packaging which consists of an ingredient which does not contain chlorine.

[0002]

[Description of the Prior Art] As a film for stretch packaging for the so-called prepackaging which garden stuff, prime meat, a daily dish, etc. are put on a lightweight tray from the former, and is overlapped with a film, the thing of a polyvinyl chloride system has mainly been used. these have good package effectiveness and a package result is also beautiful -- etc. -- it is because it has the predominance of the quality which the both sides of the vender that commodity value does not fall, and a consumer were permitted, such as excelling in the elastic recovery nature which returns even if it adds deformation of pushing the film after a pack besides package fitness with a finger, and bottom seal nature being also good and being hard to generate film peeling during transportation exhibition.

[0003]

[Problem(s) to be Solved by the Invention] However, the hydrogen chloride gas which occurs to a polyvinyl chloride system film in recent years at the time of incineration, the elution of a plasticizer contained so much have been regarded as questionable. For this reason, the ingredient which replaces a polyvinyl chloride system film is examined variously, and the various proposals of the film for stretch packaging of the configuration especially using polyolefine system resin are made. For example, the film for stretch packaging of configurations, such as an ethylene-vinylacetate copolymer (EVA), EVA / polybutene-1-/EVA, and EVA / straight chain-like ethylene-alpha olefin copolymer / EVA, is proposed. Examination of the stretch film of the two-sort 3 lamination which used in recent years for the ethylene-vinylacetate copolymer at the front lining from the reasons of a surface characteristic and transparency good as a film for stretch packaging, moderate thermal resistance, the degree of freedom of a materials design, economical efficiency, etc., and used various polypropylene regins as the principal component at the middle class is performed actively.

[0004] However, synthetic evaluation in the commercial scene which also includes main package fitness (an automatic machine, manual package) and economical efficiency, such as package workability, a package result, elastic recovery force, and bottom seal nature, in the stretch film which used as the principal component the various polypropylene regins by which the current proposal is made is still dissatisfied. Previously, this invention persons contained the propylene system polymer and petroleum resin of comparatively the low crystallinity in JP,9-154479,A, and have proposed the stretch film for food packing which has specific viscoelastic property.

[0005] In the film which consists of a propylene system polymer indicated by the above-mentioned official report and petroleum resin, Since properties, such as package workability, a package result, elastic recovery force, and bottom seal nature, could not but contain petroleum resin in a large quantity (30 % of the weight) comparatively in order to consider as the viscoelastic property of a request of a comparatively good thing, when the reinforcement of a

film changed with time, or petroleum resin carried out bleeding to a front face and it considered as a roll, they had the fault point that films will block etc.

[0006]

[Means for Solving the Problem] This invention uses a specific elasticity polypropylene resin as a principal component wholeheartedly as a result of examination. By controlling viscoelastic property, moreover, package workability, a package result, elastic recovery force, It succeeds in obtaining the non-vinyl chloride system stretch film which was further excellent also in the stability of a film with time, and economical efficiency in addition to the property of bottom seal nature. The summary It is the elasticity polypropylene resin by which a crystalline block and the stereoregularity in which the block part of amorphism nature is intermingled were controlled in the chain. It has further at least the layer which uses as a principal component the resin with which are satisfied of the conditions of following the (1) - (3). The storage modulus (E') measured at the frequency of 10Hz and the temperature of 20 degrees C by dynamic viscoelasticity measurement 5.0×10^8 dyn/cm² - 5.0×10^9 dyn/cm², It is in the film for polyolefine system stretch packaging (it sometimes only abbreviates [a stretch film or] to a film hereafter) characterized by a loss tangent ($\tan \delta$) being in the range of 0.2-0.8.

The glass transition temperature measured when a temperature up is carried out by part for heating rate/of 10 degrees C using a differential scanning calorimeter uses -15-degree-C or more (2) differential scanning calorimeter. By part for heating rate/of 10 degrees C (1) After crystal fusion, For the amount of heat of crystallization measured when the temperature is lowered to a room temperature by part for cooling rate/of 10 degrees C, after carrying out the temperature up to 200 degrees C and holding for 5 minutes at 200 degrees C, 10 - 60 J/g (3) melt flow rate (MFR) (JISK7210, 230 degrees C, 2.16kg load) is 0.4 - 40g / 10 minutes. [0007] moreover, the monomeric unit based on a propylene as an elasticity polypropylene resin by which the stereoregularity to which the crystalline block and the block part of amorphism nature are intermingled was controlled in the above-mentioned chain -- more than 95 mol % -- it contains and the resin which has the sum (mmmm+rrrr) of a meso pentad molar fraction and a racemo pentad molar fraction in 30 - 70% of range can be used suitably.

[0008]

[Embodiment of the Invention] Hereafter, this invention is explained in detail. this invention stretch film has further at least the layer which uses as a principal component the resin which is an elasticity polypropylene resin by which a crystalline block and the stereoregularity in which the block part of amorphism nature is intermingled were controlled, and satisfies the conditions of following the (1) - (3) into a chain, and has specific viscoelastic property as the whole film. The glass transition temperature measured when a temperature up is carried out by part for heating rate/of 10 degrees C using a differential scanning calorimeter uses -15-degree-C or more (2) differential scanning calorimeter. By part for heating rate/of 10 degrees C (1) After crystal fusion, For the amount of heat of crystallization measured when the temperature is lowered to a room temperature by part for cooling rate/of 10 degrees C, after carrying out the temperature up to 200 degrees C and holding for 5 minutes at 200 degrees C, 10 - 60 J/g (3) melt flow rate (MFR) (JISK7210, 230 degrees C, 2.16kg load) is 0.4 - 40g / 10 minutes. [0009] The elasticity polypropylene resin (it may be hereafter called the (A) component) to which the crystalline block and the block part of amorphism nature are intermingled in a chain here The crystalline block parts of isotactic structure and syndiotactic structure which generally have rubber elasticity, are flexible, cannot be torn easily, and have the property that transparency is also good, and show stiffness, By making a rate with the block part of the amorphism nature of the atactic structure which shows elastomer nature balance, it is suitable for attaining the purpose of this invention. Although it means existing in a chain that the crystalline block and the block part of amorphism nature are intermingled here random-wise [a crystalline block and the block part of amorphism nature], and/or in block and the chain length of each block part may be arbitrary, it is more desirable from points, such as transparency and an appearance, for the distribution to be random-like in this invention. Moreover, the principal component in this invention means that there are most contents (% of the weight) of the (A) component, and coming to contain exceeding 50 % of the weight preferably in the layer containing the (A)

and the loss tangent ($\tan\delta$) in the ordinary temperature which is the purpose of this invention is hard coming to go into request within the limits and is not desirable.

[0014] Moreover, when thermal resistance falls [the monomeric unit based on a propylene] less than [90 mol %], the crystalline control range by stereoregularity becomes narrow, or an α olefin is copolymerized, and glass transition temperature falls considerably rather than the glass transition temperature (before or after -10 degrees C) of polypropylene original, the loss tangent ($\tan\delta$) in ordinary temperature becomes very small, and it is not desirable from a viewpoint of economical efficiency. About stereoregularity, 30 – 70% of range and the thing by which the sum ($m_{mmmm}+r_{rrrr}$) of 25 – 50% and a meso pentad molar fraction, and a racemo pentad molar fraction was controlled for the meso pentad molar fraction (m_{mmmm}) by 40 – 65% of range especially preferably have the desirable sum ($m_{mmmm}+r_{rrrr}$) of a meso pentad molar fraction and a racemo pentad molar fraction 25 to 60% as one index which shows the rate of a crystalline block part. Here, the above ($m_{mmmm}+r_{rrrr}$) of crystallinity is too low at less than 30%, film production nature is very bad, and also in ordinary temperature, a film is too soft, or reinforcement is insufficient and there is a problem practically. Moreover, it becomes easy to block the raw material itself, and is not desirable in respect of handling nature. On the other hand, if ($m_{mmmm}+r_{rrrr}$) exceeds 70%, the loss tangent ($\tan\delta$) in the ordinary temperature which is the purpose of this invention is hard coming to go into request within the limits and is not desirable. Moreover, in order to require the big force at the time of film expansion and to show only still more uneven elongation at it, it is hard to be suitable for a stretch film.

[0015] The value of the meso pentad molar fraction (m_{mmmm}) used for this invention or a racemo pentad molar fraction (r_{rrrr}) is computed based on the measurement result of ^{13}C -NMR (nuclear magnetic resonance) spectrum. That is, ^{13}C -NMR spectrum was measured and it asked by the difference in the chemical shift by the stereoregularity of a methyl group from the signal intensity ratio of each fission peak ($m_{mmmm}-m_{rrrr}$) which appears in a 22.5 ppm – 19.5 ppm field. As opposed to the principal chain by the carbon-carbon bonding constituted per five propylenes with which arbitration follows Above m_{mmmm} (meso pentad molar fraction) Each of five methyl groups which is side chains means the spacial configuration located in this direction, or its rate. With r_{rrrr} (racemo pentad molar fraction) Five methyl groups which are side chains mean the spacial configuration located in an opposite direction by turns, or its rate to the principal chain by the carbon-carbon bonding constituted per five propylenes with which arbitration continues. In addition, attribution of the signal of a methyl group field is A.Zambelli. et It was based on al (Macromolecules 8 and 687 (1975)).

[0016] In addition, two or more kinds can be mixed and the (A) component can also be used, if the purpose of this invention is suited. moreover, as the manufacture approach of such an elasticity polypropylene regin Use a cheap propylene monomer as a principal component, and various kinds of metallocene system catalysts (single site catalyst), a solid-state-like titanium system catalyst, etc. are used. The elasticity polypropylene regin which controlled the good stereoregularity of fabrication nature as efficient and resin which the approach of carrying out a polymerization is proposed by low cost, and is used Although it will not be limited especially if the main point of this invention is satisfied, as concrete goods, it is Huntsman. Polymer The trade name "REXflex" of Corporation can be illustrated.

[0017] That to which $5.0 \times 10^8 \text{ dyn/cm}^2$ – $5.0 \times 10^9 \text{ dyn/cm}^2$, and a loss tangent ($\tan\delta$) have the storage modulus (E') measured at the frequency of 10Hz and the temperature of 20 degrees C by dynamic viscoelasticity measurement in the range of 0.2–0.8 needs to be used for this invention film. Here, $\tan\delta$ (loss tangent) is a storage modulus (E'). It is, the ratio ($\tan\delta = E''/E'$), i.e., the loss tangent, of the receiving loss modulus (E''), and means that a viscous contribution is large among the loss moduli of an ingredient (E''), i.e., viscoelastic property, in the temperature field where this value is high. By evaluating the temperature field which shows the value and the high value of this $\tan\delta$, it becomes the big standard which judges the stress relaxation behavior of the film in the various packaging processes by the manual package and automatic machine using a stretch film etc.

[0018] the above-mentioned storage modulus (E') -- $5.0 \times 10^8 \text{ dyn/cm}^2$ It is soft in it being the following, and to deformation, since stress is too small, workability is bad, and the flare of the film

of a pack article does not have it, either, and it is not suitable as a stretch film. On the other hand, E' is 5.0×10^9 dyn/cm². If it exceeds, it will be hard, will become a pile film on elongation, and will be easy to produce deformation fellow blurring of a tray. the suitable range of E' — $8.0 \times 10^8 - 3.0 \times 10^9$ dyn/cm² it is . Moreover, since restoration behavior [as opposed to / that $\tan \delta$ is less than 0.2 / the elongation of a film] is momentary, until it inserts a film into the bottom of a tray, while it is small, a film reverts, and it is easy to generate a wrinkling, without the ability stretching a film well. Moreover, since sufficient welding by heat does not do easily in the case of stretch packaging, the heat-sealing condition of a pars basilaris ossis occipitalis also becomes easy to produce peeling of a bottom seal after a package and during transportation thru/or exhibition gradually. If $\tan \delta$ exceeds 0.8, although the package result is good, plasticity-deformation is shown, the flare to the external force of a pack article is too weak, by the pile under transportation thru/or exhibition etc., the film on the top face of a tray tends to curtain, and commodity value tends to fall. Moreover, in an automatic package, for an elongation and cone reason, it is easy to produce the problem of a poor chuck perpendicularly. Especially the suitable range of $\tan \delta$ is 0.30–0.60.

[0019] Furthermore, for a stretch film, the storage modulus (E') measured at the frequency of 10Hz and the temperature of 0 degree C by dynamic viscoelasticity measurement for that purpose although it was desirable for the low-temperature property (especially elongation) to be excellent since it was used at the time of low temperature is 1.5×10^{10} dyn/cm². It is desirable that it is in the following range. Since glass transition temperature is higher than other low crystallinity polypropylene regins, in order to secure flexibility, such as low-temperature elongation, as for the elasticity polypropylene regin which suits this invention and which mainly controlled stereoregularity, it is desirable to consider so that the above-mentioned property may be fulfilled. For that purpose, what is necessary is just to adjust the class of other resin mixed to the rate of crystalline block parts, such as a meso pentad molar fraction (mmmm) and a racemo pentad molar fraction (rrrr), the propylene, class and rate of the component to copolymerize, and it etc. Since it may be difficult to reconcile E' and $\tan \delta$ only of the (A) component although it is necessary to choose a thing suitable as the aforementioned (A) component in order to consider as above-mentioned [the viscoelastic property of the film of this invention] within the limits, it is practical to carry out to mix the ingredient of others [**** / carrying out the laminating of the layer of other ingredients] etc., and to adjust the property.

[0020] While adjusting the viscoelastic property of a film by mentioning non-chlorine-based ingredient layers, such as polyolefine system resin and a flexible styrene-butadiene system elastomer, as other resin layers, and carrying out the laminating of these in the case of a laminating, the tractive characteristics of a film are improved, and moderate reinforcement and elongation come to be shown, and the elongation in low temperature is improved. Here, especially as a charge of a laminated wood, polyolefine system resin is suitable from the field of grant of a surface characteristic or economical efficiency, and use of low density polyethylene, super-low density polyethylene (copolymer of ethylene and an alpha olefin), an ethylene-vinylacetate copolymer (EVA), an ethylene-alkyl acrylate copolymer, an ethylene-alkyl methacrylate copolymer, an ethylene-acrylic-acid copolymer, an ethylene-methacrylic-acid copolymer, ionomer resin, a propylene system elastomeric material, etc. is recommended.

[0021] Above-mentioned EVA can be used suitably practically, for example, and the thing for 0.2–5g / 10 minutes (JISK7210, 190 degrees C, 2.16kg load) is preferably suitable for a melt flow rate (MFR) for a vinyl acetate content ten to 20% of the weight five to 25% of the weight as this EVA. The film with which a vinyl acetate content is obtained at less than 5 % of the weight is hard here, and flexibility and elastic recovery nature fall, and it is hard to discover surface adhesiveness. On the other hand, if 25 % of the weight is exceeded, surface adhesiveness will be too strong, it will begin to wind, and a sex and an appearance will tend to fall. Moreover, since film production stability will fall and it will become easy to produce a fall, variation, etc. of thickness spots or dynamics reinforcement if extrusion nature falls and MFR, on the other hand, exceeds 5g / 10 minutes in 0.2g / less than 10 minutes, it is not desirable.

[0022] Moreover, when mixing other ingredients, it is desirable to mix (B) petroleum resin, terpene resin, coumarone-indene resin, rosin system resin, or those hydrogenation derivatives.

(B) Since glass transition temperature of a component is high, it can raise the glass transition temperature of mixture. It is effective in reconciling the loss tangent ($\tan\delta$) which shows the storage modulus (E') which shows an extensibility suitable as a stretch film in ordinary temperature by this, and moderate stress relaxation nature.

[0023] As petroleum resin, it is a cyclopentadiene or the alicyclic petroleum resin from the dimer, and C9 among the (B) components here. There is aromatic series petroleum resin from a component, and the esterification rosin resin to which terpene resin and terpene-phenol resin from beta-pinene denaturalized with rosin resin, such as gum rosin and wood rosin, a glycerol, pentaerythritol, etc. as rosin system resin again can be illustrated as terpene resin. Although it is known that comparatively good compatibility is shown when the above-mentioned (B) component is mixed for the aforementioned (A) component etc., it is desirable to use a hydrogenation derivative from a color tone, thermal stability, and compatibility. In addition, although that in which the (B) component mainly has various glass transition temperature with molecular weight is obtained, 50–100 degrees C of glass transition temperature of this invention being suited are a 70–90-degree C thing preferably. When it mixes that glass transition temperature is less than 50 degrees C with the above-mentioned (A) component, in order to acquire desired viscoelastic property, it is necessary to make it contain so much, and it is easy to cause blocking of the ingredient by the bleeding to a front face, or a film. Moreover, it may become a problem practically that a mechanical strength is insufficient as the whole film, and it is easy to be torn. On the other hand, in that by which glass transition temperature exceeds 100 degrees C, compatibility with the (A) component may get worse, bleeding may be carried out to a film front face with time, and blocking and the fall of transparency may be caused.

[0024] Little way of a content is [the above-mentioned reason to the (B) component] desirable within limits which can attain the above-mentioned viscoelastic property. Since the elasticity polypropylene resin which had the stereoregularity applied to this invention controlled by this point has the glass transition temperature of about -10 degrees C or more, it acts on the propylene used ordinarily conventionally effective in the content of the (B) component adjusting even about 20 or less % of the weight of a small addition to desired viscoelastic property as compared with the low crystallinity polypropylene resin which the alpha olefin etc. contained so much. In the film of this invention, besides the (B) component mentioned above, the main point of this invention is not exceeded, and it is the range which does not worsen the appearance of a film and the following polyolefine system resin and styrene system elastomers which are usually used for a polyolefine system constituent can be blended.

[0025] for example, a copolymer (a propylene-ethylene copolymer --) with other monomers in which the homopolymer of a propylene or a propylene, and copolymerization are possible in a polypropylene resin a propylene-ethylene-alpha olefin copolymer etc. -- etc. -- by polyethylene system resin An ethylene-vinylacetate copolymer (a vinyl acetate content is 5 - 40 % of the weight), The carbon number of low density polyethylene and an alpha olefin The ethylene-alpha olefin copolymer of 4-8, An ethylene-acrylic-acid copolymer (an acrylic-acid content is 5 - 20 % of the weight), An alpha olefin and acrylic acids, such as an ethylene-methyl-methacrylate copolymer, ethylene, and a propylene, By the styrene system elastomer, the metal salt of a copolymer with the monomer chosen from the methacrylic acid, the maleic acid, etc. (Zn, Na, K, Li, Mg, etc.) A styrene-butadiene block copolymer or its hydrogenation derivative, the hydrogenation derivative of a styrene-butadiene random copolymer, the hydrogenation derivative of a styrene-isoprene block copolymer, etc. are mentioned.

[0026] These can blend preferably one sort or two sorts or more with the improvement list of package fitness, such as the cut nature of a film, and a low-temperature property, one to 40% of the weight less than 50% of the weight for the purpose of improvement in economical efficiency. in addition, the range where the thickness of this invention film is generally used as a usual object for stretch packaging -- that is, about 8-30 micrometers are in the range of about 10-20 micrometers typically. Moreover, when considering as a laminated film, it is 0.4-0.8 preferably and 0.3 to 0.9 and that it is specifically 5-20 micrometers have a ratio desirable [the thickness of the layer which uses as a principal component the (A) component mentioned above] to the whole thickness from the field of many properties as a stretch film, and economical efficiency.

[0027] this invention film is obtained by fabricating an ingredient in the shape of a film with melting extrusion, inflation molding, or T-die shaping from an extruder. When considering as a laminated film, co-extruding with a multilayer die is advantageous. It is desirable that carry out melting extrusion of the ingredient resin, and it carries out inflation molding from an annular die practical, as for the blow up ratio in that case (the diameter of a bubble / diameter of a die), four or more are desirable, and especially the range of 5-7 is suitable for it. Whichever of the approach of cooling from both sides of an inside as the cooling approach in that case outside the approach and tube which are cooled from the external surface of a tube is sufficient.

Furthermore, the film obtained here is heated below to the crystallization temperature of resin, and using the speed difference between nip rolls, it extends 1.2 to 5 times to the lengthwise direction of a film, or you may increase biaxial stretching 1.2 to 5 times in the both directions of a film in every direction.

[0028] In order to give engine performance, such as fog resistance, antistatic nature, slipping nature, and self-adhesiveness, to the film of this invention, the various following additives can be suitably blended with the layer which uses a surface layer and/or the (A) component as a principal component. for example, a carbon number -- 1-12 -- with the fatty alcohol of 1-6 preferably A carbon number on 10-22, the fatty alcohol system fatty acid ester that is a compound with the fatty acid of 12-18 preferably, and a concrete target Mono-glycerol olate, polyglycerin olate, glycerol triricinolate, Glycerol acetyl triricinolate, polyglycerin stearate, polyglycerin laurate, Methyl acetyl triricinolate, ethyl acetyl triricinolate, butyl acetyl triricinolate, Propylene glycol olate, propylene glycol laurate, Pentaerythritol olate, polyethylene-glycol olate, Polypropylene-glycol olate, sorbitan olate, sorbitan laurate, On polyalkylene ether polyol and a concrete target, polyethylene-glycol sorbitan olate, polyethylene-glycol sorbitan laurate, etc. It is desirable 0.1 - 12 weight section and to carry out 1-8 weight section combination of at least one sort of the compound chosen from paraffin series oil etc. suitably further to the resinous principle 100 weight section which constitutes each class, such as a polyethylene glycol and a polypropylene glycol.

[0029]

[Example] Hereafter, although an example explains this invention in more detail, this invention does not receive a limit at all by these. In addition, the various measured value about a film and evaluation which are displayed into this specification were performed as follows. Here, the direction of taking over from the extruder of a film (flow direction) is called a lengthwise direction, and the rectangular direction is called a longitudinal direction.

[0030] (1) Using E' and tandelta Iwamoto Factory viscoelasticity spectrometer VES-F3, by part for oscillation frequency [of 10Hz], and programming-rate/of 1 degree C, it measured from -50 degrees C to 150 degrees C, and the temperature of 20 degrees C and the value in 0 degree C were displayed from the obtained data about the longitudinal direction of a film.

[0031] (2) Using the stretch film with a stretch packaging fitness width of face of 350mm, the form polystyrene tray (die length of 200mm, width of face of 130mm, height of 30mm) was packed with the automatic packer (ISHIDA-WminMK-II made from the Ishida ****), and it evaluated about the item shown in Table 3. Moreover, the hand packaging machine (diamond wrapper A-105 by Mitsubishi Plastics Industries, Ltd.) performed the package trial using the same film and the same tray.

[0032] (3) The stability of the bubble at the time of fabricating a film by the stability inflation manufacturing facility of film production was evaluated.

O -- [-- Film production is impossible.] Extremely stable O -- Stable ** -- A little unstable x

[0033] (4) Glass transition temperature (Tg), a melting out temperature (Tm)

the PerkinElmer, Inc. make -- it asked using DSC-7 from the thermogram when carrying out the temperature up of the 10mg of the samples by part for heating rate/of 10 degrees C according to JIS-K7121.

[0034] (5) After carrying out the temperature up of the 10mg of the samples to 200 degrees C after crystal fusion by part for heating rate/of 10 degrees C and holding them for 5 minutes at 200 degrees C according to JIS-K7121 and JIS-K7122 using 7, it asked from the thermogram when lowering the temperature to a room temperature by part for DSC[by amount PerkinElmer,

Inc. of crystallization (temperature T_c) heat of crystallization]-cooling rate/of 10 degrees C.

[0035] (6) Melt flow rate (MFR)

According to JIS-K7210, it measured on condition that the test temperature of 230 degrees C, and test load 2.16kgf.

[0036] (7) A meso pentad molar fraction (mmmm), a racemo pentad molar fraction (rrrr)

It measured the following condition using JNM-GSX -270 (^{13}C -nuclear-magnetic-resonance frequency of 67.8MHz) by JEOL Co., Ltd.

measurement mode: 1H-perfect decoupling pulse width: -- 8.6-microsecond pulse repetition-time: -- count of 30-second addition: -- 7200 times solvent: -- mixed solvent (80/20 capacity %) of an alt.dichlorobenzene / heavy benzene

sample concentration: -- 100mg / 1ml solvent measurement temperature: -- it asked for 130 degrees C of each pentad molar fractions here by measurement of the fission peak in the methyl group field of a ^{13}C -nuclear-magnetic-resonance spectrum. Moreover, attribution of the signal of a methyl group field is A.Zambelli. et It was based on al (8 Macromolecules 687 (1975)).

[0037] (8) the roll of an aging profit **** film was kept for ten days to the thermostatic chamber of the conditions of the temperature of 50 degrees C, and 60% of relative humidity, it rolled back with the subsequent surface state, and the sex was evaluated.

O -- There is neither bleeding of the additive to a front face nor blocking of films.

O -- Although there is almost no bleeding of the additive to a front face, it has a little blocking of films.

** -- Slight bleeding of the additive to a front face occurs, and exfoliation is also a little heavy by blocking of films.

x -- There is much bleeding of the additive to a front face, and blocking of films cannot be used practically severely, either.

[0038] (Example 1) Let the elasticity polypropylene resin (I) by which stereoregularity was controlled, and (T_m =155 degree C, the product made from Huntsman Polymer Corporation, and "REXflex W101") be interlayers for propylene content:100-mol %, mmmm=35.3%, rrrr=15.4%, and MFR =16g /, and 10 minutes. Co-extrusion inflation molding of the layer of the constituent which carried out melting kneading of the diglycerol mono-olate 3.0 weight section as an antifogger at the EVA(15 % of the weight [of vinyl acetate contents], 190-degree-C, 10 MFR=2.0g /, minutes in 2.16kg load) 100 weight section be carried out to 11 micrometers in thickness and both sides of those by the three layer die temperature of 190 degrees C of annular, and blow up ratio 5.5 so that it might be respectively set to 2 micrometers, and the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) be obtained.

[0039] In addition, the property which measured the film which consists of this elasticity polypropylene resin (I) simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 5.4×10^9 dyn/cm² 20 degree C (E') Loss tangent in 4.8×10^8 dyn/cm² 20 degree C ($\tan \delta$) 0.34 glass transition temperature (T_g) The amount of -6-degree-C heat of crystallization 25 J/g crystallization temperature (T_c) 99 degrees C [0040] (Example 2) In the example 1, the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1

except having used 20% of the weight of the mixed constituent for the hydrogenation derivative of cyclopentadiene system petroleum resin of 125 degrees C of softening temperatures (glass transition temperature of 81 degrees C) to elasticity polypropylene resin (I)80% of the weight as a raw material for interlayers.

[0041] In addition, the property which measured the film which consists only of mixture of the above-mentioned elasticity polypropylene resin (I) and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 1.9×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 1.4×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.59 glass transition temperature (T_g) 2 degrees C [0042] (Example 3) Set in the example 2. It replaced with the elasticity polypropylene resin (I), and the film with a thickness [total] of 15 micrometers (2 micrometers / 11

micrometers / 2 micrometers) was obtained like the example 1 except having used an elasticity polypropylene resin (II) and (T_m =158 degree C, the product made from Huntsman Polymer

Corporation, and "REXflex W110") for propylene content:100-mol %, mmmm=44.5%, rrrr=12.3%, and MFR =6g / and 10 minutes.

[0043] In addition, the property which measured the film which consists of an above-mentioned elasticity polypropylene resin (II) simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 1.1×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 1.5×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.25 glass transition temperature (T_g) The amount of -7-degree-C heat of crystallization 35 J/g crystallization temperature (T_c) 102 degrees C [0044] Moreover, the property which measured the film which consists only of mixture of the above-mentioned elasticity polypropylene resin (II) and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 1.8×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 2.6×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.49 glass transition temperature (T_g) 5 degrees C [0045] (Example 4) Set in the example 1. the elasticity polypropylene resin (III) (propylene content: -- 97-mol % --) by which stereoregularity was controlled as a raw material for interlayers Ethylene content : Three-mol %, mmmm=37.4%, rrrr=11.4%, MFR=19g / , 10 minutes, T_m=149 degree C, Huntsman Polymer The product made from Corporation, "REXflex W201" The film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used 15% of the weight of the mixed constituent for the hydrogenation petroleum resin used to 85% of the weight in the example 2.

[0046] In addition, the property which measured the film which consists of an elasticity polypropylene resin (III) simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 2.9×10^9 dyn/cm² 20 degree C (E') Loss tangent in 4.3×10^8 dyn/cm² 20 degree C ($\tan \delta$) 0.26 glass transition temperature (T_g) The amount of -10-degree-C heat of crystallization 21 J/g crystallization temperature (T_c) 95 degrees C [0047] Moreover, the property which measured the film which consists only of mixture of the above-mentioned elasticity polypropylene resin (III) and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 9.2×10^9 dyn/cm² 20 degree C (E') Loss tangent in 6.2×10^8 dyn/cm² 20 degree C ($\tan \delta$) 0.52 glass transition temperature (T_g) -2 degree C [0048] (Example 5) The film with a thickness [total] of 15 micrometers (4 micrometers / 7 micrometers / 4 micrometers) was obtained like the example 1 except having changed the laminating thickness ratio of an interlayer and a front lining as follows in the example 4.

[0049] (Example 1 of a comparison) Set in the example 1. as the raw material for interlayers -- an elasticity polypropylene resin (I) -- replacing with -- a low crystallinity propylene-ethylene-propylene copolymer elastomer (propylene content: -- 88-mol % --) The film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used T_m=156 degree C, Tokuyama Make, and P.E.R.T310J (henceforth "PER") for MFR=1.5g / , and 10 minutes.

[0050] In addition, the property which measured the film which consists of the above-mentioned PER simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 3.6×10^9 dyn/cm² 20 degree C (E') Loss tangent in 2.1×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.07 glass transition temperature (T_g) The amount of -25-degree-C heat of crystallization 31 J/g crystallization temperature (T_c) 101 degrees C [0051] (Example 2 of a comparison) Set in the example 1. as the raw material for interlayers -- an elasticity polypropylene resin (I) -- replacing with -- an elasticity polypropylene resin (IV) (propylene content: -- 100-mol % --) mmmm=63.0%, rrrr=8.0%, and MFR=2g / , 10 minutes, T_m=158 degree C, Huntsman Polymer The film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used the product made from Corporation, and "REXflex W105."

[0052] In addition, the property which measured the film which consists of an above-mentioned elasticity polypropylene resin (IV) simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 1.6×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 3.7×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.14 glass transition temperature (T_g) The

amount of -6-degree-C heat of crystallization 54 J/g crystallization temperature (Tc) 108 degrees C [0053] (Example 3 of a comparison) In the example 2, the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 2 except having used PER which replaced with the elasticity polypropylene resin (I) and was used in the example 1 of a comparison.

[0054] In addition, the property which measured the film which consists only of mixture of PER and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 4.8×10^9 dyn/cm² 20 degree C (E') Loss tangent in 1.2×10^9 dyn/cm² 20 degree C (tan delta) 0.23 glass transition temperature (Tg) -16 degree C [0055] (Example 4 of a comparison) In the example 1, the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used 30% of the weight of the mixed constituent for the hydrogenation petroleum resin used for 70 % of the weight of PER used in the example 1 of a comparison as a raw material for interlayers in the example 2.

[0056] In addition, the property which measured the film which consists only of mixture of PER and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 9.0×10^9 dyn/cm² 20 degree C (E') Loss tangent in 2.0×10^9 dyn/cm² 20 degree C (tan delta) 0.35 glass transition temperature (Tg) -7 degree C [0057] (Example 5 of a comparison) In the example 2, the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 2 except having replaced with the elasticity polypropylene resin (I) and having used the elasticity polypropylene resin (IV).

[0058] In addition, the property which measured the film which consists only of mixture of an elasticity polypropylene resin (IV) and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 2.2×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 6.5×10^9 dyn/cm² 20 degree C (tan delta) 0.26 glass transition temperature (Tg) 6 degrees C [0059] (Example 6 of a comparison) It evaluated about the commercial polyvinyl chloride stretch film (15 micrometers in thickness). About the above-mentioned example 1 thru/or 5 and the example 1 of a comparison thru/or 6, the measured value of the viscoelastic property of each laminated film (the example 6 of a comparison is a monolayer) etc. was shown in Table 1, and evaluation of stretch packaging proper ** was shown in Table 2.

[0060]

[Table 1]

表 1

	20°C		0°C	製膜 安定性
	E'	tan δ	E'	
実施例 1	8.6×10^8	0.27	5.2×10^9	○
実施例 2	1.4×10^9	0.47	1.3×10^{10}	○
実施例 3	2.3×10^9	0.43	1.4×10^{10}	◎
実施例 4	7.6×10^8	0.36	8.1×10^9	○
実施例 5	8.9×10^8	0.25	6.0×10^9	◎
比較例 1	1.8×10^9	0.07	3.3×10^9	◎
比較例 2	3.0×10^9	0.14	1.2×10^{10}	◎
比較例 3	1.2×10^9	0.17	4.1×10^9	○
比較例 4	1.7×10^9	0.26	6.5×10^9	△
比較例 5	5.1×10^9	0.25	1.7×10^{10}	○
比較例 6	1.9×10^9	0.35	5.5×10^9	—

[Table 2]

表 2

評価項目	手包装		自動機		共通					* 総合 評価
	シワ	耐破れ	カット 搬送	仕上り	底 シール	復元性	張り	低温 特性	経時 変化	
実施例 1	○	◎	○	○	○	○	○	◎	◎	○
実施例 2	○	○	○	◎	◎	○	◎	○	○	○
実施例 3	◎	○	◎	◎	◎	○	◎	○	○	◎
実施例 4	○	○	○	◎	◎	◎	○	◎	◎	◎
実施例 5	○	○	○	○	○	◎	○	◎	◎	○
比較例 1	○	○	△	×	△	△	◎	◎	◎	×
比較例 2	○	○	○	△	△	△	◎	○	◎	△
比較例 3	○	○	△	△	△	△	◎	◎	△	△
比較例 4	○	○	○	○	○	○	◎	◎	×	×
比較例 5	△	○	◎	○	○	△	◎	△	○	△
比較例 6	◎	◎	◎	○	◎	◎	◎	◎	○	◎

*【総合評価の基準】

- ◎：全項目の評価が○か◎であり、かつ◎が4つ以上あるもの
 ○：全項目の評価が○か◎であるが、◎が3つ以下であるもの
 △：全項目の評価に×は無いが、△が1つでもあるもの
 ×：全項目の評価に×が1つでもあるもの

[Table 3]

表 3

		評価方法	評価基準			
			×	△	○	◎
手 包 装	シ ワ	特にシワの発生し 易いトレコーナ ー部を評価	大きなシワ が発生する	少し シワがある	僅かに シワがある	全く シワがない
	耐 破 れ	特に破れの発生し 易いトレコーナ ー部における破れ 易さを評価	非常に 破れ易い	やや 破れ易い	時々破れる ことがある	ほとん ど破れ ない
自 動 機	カ ット 搬 送 性	カット時の切断面 のカールや、搬送 時のチャック状態 を評価	カット搬送 が出来ない	やや 問題あり	まあまあで ある	全く 問題ない
	仕 上 り 適 性	包装条件（張りの 強さ）を25水準に 変え包装仕上がり の良好な水準数率 を評価	0/25 ～ 3/25	4/25 ～ 10/25	11/25 ～ 15/25	16/25 ～ 25/25
共 通	底シール 性	熱板温度100℃と し、包装後のシー ル状態を評価	熱による穴 があったり、 割がれ長い	やや割がれ 生ずる	僅かに割が れ生ずる	通常の取扱 いでは割が れない
	復 元 性	バック品の中央部 を指で底まで押し た後の指の押跡の 状況の評価	完全に 押跡が残る	かなり 押跡が残る	僅かに 押跡が残る	完全に 復元する
	フィ ル ム の 張 り	バック品の上面を 手で押さえた時の 反発性や積み重ね 時のたるみを評価	張りが弱す ぎてたより なく、たる みも生じる	かなり張り が弱い	やや張りが 弱い	張りが良く 反発性も 良い
	低 温 特 性	5℃の環境で包装 したときの破れ易 さやトレーの変形 を評価	フィルム破 れが生じト レーも変形 する	フィルム破 れやトレー の変形が生 じやすい	フィルム破 れやトレー の変形が 時々生ずる	問題ない

[0061] It turns out that each of examples 1 in the range which viscoelastic property specifies by this invention from Table 1 thru/or 3 using the resin specified by this invention thru/or films of 5 is synthetically excellent in many properties as a stretch film. On the other hand, it turns out that the example 1 of a comparison thru/or the film of 5 out of range which resin differs or viscoelastic property specifies by this invention is inferior to the synthetic property as a stretch film.

[0062]

[Effect of the Invention] According to this invention stretch film, when it is used for an automatic packer etc., a cut and conveyance, and wrapping of a film can be performed satisfactory, good, the flare of a film can acquire a good package object and bottom seal nature has the description it is featureless to the former as a non-chlorine-based stretch film. It excels also in stability and economical efficiency still more with time.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the stretch film used suitable for food packing, especially the film for stretch packaging which consists of an ingredient which does not contain chlorine.

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PRIOR ART

[Description of the Prior Art] As a film for stretch packaging for the so-called prepackaging which garden stuff, prime meat, a daily dish, etc. are put on a lightweight tray from the former, and is overlapped with a film, the thing of a polyvinyl chloride system has mainly been used. these have good package effectiveness and a package result is also beautiful -- etc. -- it is because it has the predominance of the quality which the both sides of the vender that commodity value does not fall, and a consumer were permitted, such as excelling in the elastic recovery nature which returns even if it adds deformation of pushing the film after a pack besides package fitness with a finger, and bottom seal nature being also good and being hard to generate film peeling during transportation exhibition.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention stretch film, when it is used for an automatic packer etc., a cut and conveyance, and wrapping of a film can be performed satisfactory, good, the flare of a film can acquire a good package object and bottom seal nature has the description it is featureless to the former as a non-chlorine-based stretch film. It excels also in stability and economical efficiency still more with time.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the hydrogen chloride gas which occurs to a polyvinyl chloride system film in recent years at the time of incineration, the elution of a plasticizer contained so much have been regarded as questionable. For this reason, the ingredient which replaces a polyvinyl chloride system film is examined variously, and the various proposals of the film for stretch packaging of the configuration especially using polyolefine system resin are made. For example, the film for stretch packaging of configurations, such as an ethylene-vinylacetate copolymer (EVA), EVA / polybutene-1-/EVA, and EVA / straight chain-like ethylene-alpha olefin copolymer / EVA, is proposed. Examination of the stretch film of the two-sort 3 lamination which used in recent years for the ethylene-vinylacetate copolymer at the front lining from the reasons of a surface characteristic and transparency good as a film for stretch packaging, moderate thermal resistance, the degree of freedom of a materials design, economical efficiency, etc., and used various polypropylene regins as the principal component at the middle class is performed actively.

[0004] However, synthetic evaluation in the commercial scene which also includes main package fitness (an automatic machine, manual package) and economical efficiency, such as package workability, a package result, elastic recovery force, and bottom seal nature, in the stretch film which used as the principal component the various polypropylene regins by which the current proposal is made is still dissatisfied. Previously, this invention persons contained the propylene system polymer and petroleum resin of comparatively the low crystallinity in JP,9-154479,A, and have proposed the stretch film for food packing which has specific viscoelastic property.

[0005] In the film which consists of a propylene system polymer indicated by the above-mentioned official report and petroleum resin, Since properties, such as package workability, a package result, elastic recovery force, and bottom seal nature, could not but contain petroleum resin in a large quantity (30 % of the weight) comparatively in order to consider as the viscoelastic property of a request of a comparatively good thing, when the reinforcement of a film changed with time, or petroleum resin carried out bleeding to a front face and it considered as a roll, they had the fault point that films will block etc.

[Translation done.]

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MEANS

[Means for Solving the Problem] This invention uses a specific elasticity polypropylene resin as a principal component wholeheartedly as a result of examination. By controlling viscoelastic property, moreover, package workability, a package result, elastic recovery force, It succeeds in obtaining the non-vinyl chloride system stretch film which was further excellent also in the stability of a film with time, and economical efficiency in addition to the property of bottom seal nature. The summary It is the elasticity polypropylene resin by which a crystalline block and the stereoregularity in which the block part of amorphism nature is intermingled were controlled in the chain. It has further at least the layer which uses as a principal component the resin with which are satisfied of the conditions of following the (1) - (3). The storage modulus (E') measured at the frequency of 10Hz and the temperature of 20 degrees C by dynamic viscoelasticity measurement 5.0×10^8 dyn/cm² - 5.0×10^9 dyn/cm². It is in the film for polyolefine system stretch packaging (it sometimes only abbreviates [a stretch film or] to a film hereafter) characterized by a loss tangent ($\tan \delta$) being in the range of 0.2-0.8.

The glass transition temperature measured when a temperature up is carried out by part for heating rate/of 10 degrees C using a differential scanning calorimeter uses -15-degree-C or more (2) differential scanning calorimeter. By part for heating rate/of 10 degrees C (1) After crystal fusion, For the amount of heat of crystallization measured when the temperature is lowered to a room temperature by part for cooling rate/of 10 degrees C, after carrying out the temperature up to 200 degrees C and holding for 5 minutes at 200 degrees C, 10 - 60 J/g (3) melt flow rate (MFR) (JISK7210, 230 degrees C, 2.16kg load) is 0.4 - 40g / 10 minutes. [0007] moreover, the monomeric unit based on a propylene as an elasticity polypropylene resin by which the stereoregularity to which the crystalline block and the block part of amorphism nature are intermingled was controlled in the above-mentioned chain -- more than 95 mol % -- it contains and the resin which has the sum (mmmm+rrrr) of a meso pentad molar fraction and a racemo pentad molar fraction in 30 - 70% of range can be used suitably.

[0008]

[Embodiment of the Invention] Hereafter, this invention is explained in detail. this invention stretch film has further at least the layer which uses as a principal component the resin which is an elasticity polypropylene resin by which a crystalline block and the stereoregularity in which the block part of amorphism nature is intermingled were controlled, and satisfies the conditions of following the (1) - (3) into a chain, and has specific viscoelastic property as the whole film. The glass transition temperature measured when a temperature up is carried out by part for heating rate/of 10 degrees C using a differential scanning calorimeter uses -15-degree-C or more (2) differential scanning calorimeter. By part for heating rate/of 10 degrees C (1) After crystal fusion, For the amount of heat of crystallization measured when the temperature is lowered to a room temperature by part for cooling rate/of 10 degrees C, after carrying out the temperature up to 200 degrees C and holding for 5 minutes at 200 degrees C, 10 - 60 J/g (3) melt flow rate (MFR) (JISK7210, 230 degrees C, 2.16kg load) is 0.4 - 40g / 10 minutes. [0009] The elasticity polypropylene resin (it may be hereafter called the (A) component) to which the crystalline block and the block part of amorphism nature are intermingled in a chain here The crystalline block parts of isotactic structure and syndiotactic structure which generally have

rubber elasticity, are flexible, cannot be torn easily, and have the property that transparency is also good, and show stiffness. By making a resin with the block part of the amorphism nature of the atactic structure which shows elastomer nature balance, it is suitable for attaining the purpose of this invention. Although it means existing in a chain that the crystalline block and the block part of amorphism nature are intermingled here random-wise [a crystalline block and the block part of amorphism nature], and/or in block and the chain length of each block part may be arbitrary, it is more desirable from points, such as transparency and an appearance, for the distribution to be random-like in this invention. Moreover, the principal component in this invention means that there are most contents (% of the weight) of the (A) component, and coming to contain exceeding 50 % of the weight preferably in the layer containing the (A) component in the combination resin which constitutes the layer.

[0010] Generally reinforcement of a polypropylene resin is also high at high crystallinity, and in polyolefine system resin, comparatively, high-melting takes the big force at the time of expansion for high crystallinity, although thermal resistance is also good, and only uneven elongation is shown, but even if these properties become mixture, they remain. Therefore, in this invention, in order to obtain the good film of elongation, it is desirable to use the polypropylene resin of comparatively low crystallinity. Although the thing which made ethylene or a with a carbon number of about four to 12 alpha olefin contain with gestalten, such as beyond about [10 mol %] copolymerization, is often used for the propylene and the part is conventionally used also for the film application as the above-mentioned polypropylene resin in order to make a low-temperature property and the flexibility in ordinary temperature give, in independent [these], it is not suitable for this invention visco-elastic. That is, it is because the alpha olefin contains this kind of resin so much in the propylene, so the loss tangent (tandelta) which that glass transition temperature becomes quite lower than the glass transition temperature (before or after -10 degrees C) of polypropylene original, and is later mentioned in ordinary temperature from this is very as small as less than 0.1.

[0011] The (A) component applied to this invention may fulfill the viscoelastic property mentioned later, and it raises tandelta in ordinary temperature by not reducing glass transition temperature more sharply than the glass transition temperature (before or after -10 degrees C) of polypropylene original, reducing crystallinity by mainly controlling stereoregularity. The glass transition temperature measured when a temperature up is specifically carried out by part for heating rate/of 10 degrees C, using a differential scanning calorimeter as conditions (1) uses -15 degrees C or more of things which are -10 degrees C or more suitably. Glass transition temperature becomes [the value in the ordinary temperature which the peak temperature of a loss tangent (tandelta) shifts to a low temperature side, and makes the purpose of this invention] very small at less than -15 degrees C and is not desirable.

[0012] Moreover, a temperature up is carried out to 200 degrees C after crystal fusion by part for heating rate/of 10 degrees C, using a differential scanning calorimeter as conditions (2), and after holding for 5 minutes at 200 degrees C, the amount of heat of crystallization measured when the temperature is lowered to a room temperature by part for cooling rate/of 10 degrees C uses what has 10 - 60 J/g in the range of 20 - 50 J/g suitably. The amount of heat of crystallization of crystallinity is too low in less than 10 J/g, film production nature is very bad, and also in ordinary temperature, a film is too soft, or reinforcement is insufficient and there is a problem practically. Moreover, in that by which the amount of heat of crystallization exceeds 60 J/g, the big force is required at the time of film expansion, and only uneven elongation is shown, and it is not suitable for a stretch film. further -- as conditions (3) -- the melt flow rate (MFR) in 230 degrees C and 2.16kg load -- 0.4-40g/-- 0.5-30g / thing that has 10 minutes in the range for 1.0 - 20g / 10 minutes still more suitably is used suitably for 10 minutes. When own viscosity of a polymer has a too high melt flow rate in 0.4g / less than 10 minutes, extrusion molding becomes difficult, it is not suitable and 40g / 10 minutes are exceeded, own viscosity of a polymer is too low, film production stability is lost, or the reinforcement of the film itself is insufficient and there is a problem practically.

[0013] As such an elasticity polypropylene resin In the Soxhlet extraction by the ebullition n-heptane In the Soxhlet extraction according [a part for the insoluble solution] to 2 - 50 % of the

weight, and a cold xylene preferably 60 or less % of the weight. The amount of the insoluble solution is 50 – 90 % of the weight preferably 95 or less % of the weight. More than 90 mol % and the thing by which it is more than 95 mol % suitably, and the sum (mmmm+rrrr) of a meso pentad molar fraction and a racemo pentad molar fraction was controlled by 30 – 70% of range are suitably used for the monomeric unit based on a propylene at least during a copolymerization presentation. As components other than a propylene, although ethylene or a with a carbon number of about four to 12 alpha olefin, 4-methyl pentene -1 and an annular olefin, styrene, etc. are mentioned, ethylene is used most suitably here. If the amount of [by the ebullition n-heptane] insoluble solution exceeds 60 % of the weight here or the amount of [by the cold xylene] insoluble solution exceeds 95 % of the weight, since crystallinity is high, flexibility falls, and the loss tangent (tandelta) in the ordinary temperature which is the purpose of this invention is hard coming to go into request within the limits and is not desirable.

[0014] Moreover, when thermal resistance falls [the monomeric unit based on a propylene] less than [90 mol %], the crystalline control range by stereoregularity becomes narrow, or an alpha olefin is copolymerized, and glass transition temperature falls considerably rather than the glass transition temperature (before or after -10 degrees C) of polypropylene original, the loss tangent (tandelta) in ordinary temperature becomes very small, and it is not desirable from a viewpoint of economical efficiency. About stereoregularity, 30 – 70% of range and the thing by which the sum (mmmm+rrrr) of 25 – 50% and a meso pentad molar fraction, and a racemo pentad molar fraction was controlled for the meso pentad molar fraction (mmmm) by 40 – 65% of range especially preferably have the desirable sum (mmmm+rrrr) of a meso pentad molar fraction and a racemo pentad molar fraction 25 to 60% as one index which shows the rate of a crystalline block part. Here, the above (mmmm+rrrr) of crystallinity is too low at less than 30%, film production nature is very bad, and also in ordinary temperature, a film is too soft, or reinforcement is insufficient and there is a problem practically. Moreover, it becomes easy to block the raw material itself, and is not desirable in respect of handling nature. On the other hand, if (mmmm+rrrr) exceeds 70%, the loss tangent (tandelta) in the ordinary temperature which is the purpose of this invention is hard coming to go into request within the limits and is not desirable. Moreover, in order to require the big force at the time of film expansion and to show only still more uneven elongation at it, it is hard to be suitable for a stretch film.

[0015] The value of the meso pentad molar fraction (mmmm) used for this invention or a racemo pentad molar fraction (rrrr) is computed based on the measurement result of ¹³C-NMR (nuclear magnetic resonance) spectrum. That is, ¹³C-NMR spectrum was measured and it asked by the difference in the chemical shift by the stereoregularity of a methyl group from the signal intensity ratio of each fission peak (mmmm-mrrm) which appears in a 22.5 ppm – 19.5 ppm field. As opposed to the principal chain by the carbon-carbon bonding constituted per five propylenes with which arbitration follows Above mmmm (meso pentad molar fraction) Each of five methyl groups which is side chains means the spacial configuration located in this direction, or its rate. With rrrr (racemo pentad molar fraction) Five methyl groups which are side chains mean the spacial configuration located in an opposite direction by turns, or its rate to the principal chain by the carbon-carbon bonding constituted per five propylenes with which arbitration continues. In addition, attribution of the signal of a methyl group field is A.Zambelli. et It was based on al (Macromolecules8 and 687 (1975)).

[0016] In addition, two or more kinds can be mixed and the (A) component can also be used, if the purpose of this invention is suited. moreover, as the manufacture approach of such an elasticity polypropylene regin Use a cheap propylene monomer as a principal component, and various kinds of metallocene system catalysts (single site catalyst), a solid-state-like titanium system catalyst, etc. are used. The elasticity polypropylene regin which controlled the good stereoregularity of fabrication nature as efficient and resin which the approach of carrying out a polymerization is proposed by low cost, and is used Although it will not be limited especially if the main point of this invention is satisfied, as concrete goods, it is Huntsman. Polymer The trade name "REXflex" of Corporation can be illustrated.

[0017] That to which 5.0×10^8 dyn/cm² – 5.0×10^9 dyn/cm², and a loss tangent (tandelta) have the storage modulus (E') measured at the frequency of 10Hz and the temperature of 20 degrees

C by dynamic viscoelasticity measurement in the range of 0.2–0.8 needs to be used for this invention film. Here, $\tan \delta$ (loss tangent) is a storage modulus (E'). It is, the ratio ($\tan \delta = E''/E'$), i.e., the loss tangent, of the receiving loss modulus (E''), and means that a viscous contribution is large among the loss moduli of an ingredient (E''), i.e., viscoelastic property, in the temperature field where this value is high. By evaluating the temperature field which shows the value and the high value of this $\tan \delta$, it becomes the big standard which judges the stress relaxation behavior of the film in the various packaging processes by the manual package and automatic machine using a stretch film etc.

[0018] the above-mentioned storage modulus (E') -- 5.0×10^8 dyn/cm² It is soft in it being the following, and to deformation, since stress is too small, workability is bad, and the flare of the film of a pack article does not have it, either, and it is not suitable as a stretch film. On the other hand, E' is 5.0×10^9 dyn/cm². If it exceeds, it will be hard, will become a pile film on elongation, and will be easy to produce deformation fellow blurring of a tray. the suitable range of E' -- $8.0 \times 10^8 - 3.0 \times 10^9$ dyn/cm² it is . Moreover, since restoration behavior [as opposed to / that $\tan \delta$ is less than 0.2 / the elongation of a film] is momentary, until it inserts a film into the bottom of a tray, while it is small, a film reverts, and it is easy to generate a wrinkling, without the ability stretching a film well. Moreover, since sufficient welding by heat does not do easily in the case of stretch packaging, the heat-sealing condition of a pars basilaris ossis occipitalis also becomes easy to produce peeling of a bottom seal after a package and during transportation thru/or exhibition gradually. If $\tan \delta$ exceeds 0.8, although the package result is good, plasticity-deformation is shown, the flare to the external force of a pack article is too weak, by the pile under transportation thru/or exhibition etc., the film on the top face of a tray tends to curtain, and commodity value tends to fall. Moreover, in an automatic package, for an elongation and cone reason, it is easy to produce the problem of a poor chuck perpendicularly. Especially the suitable range of $\tan \delta$ is 0.30–0.60.

[0019] Furthermore, for a stretch film, the storage modulus (E') measured at the frequency of 10Hz and the temperature of 0 degree C by dynamic viscoelasticity measurement for that purpose although it was desirable for the low-temperature property (especially elongation) to be excellent since it was used at the time of low temperature is 1.5×10^{10} dyn/cm². It is desirable that it is in the following range. Since glass transition temperature is higher than other low crystallinity polypropylene regins, in order to secure flexibility, such as low-temperature elongation, as for the elasticity polypropylene regin which suits this invention and which mainly controlled stereoregularity, it is desirable to consider so that the above-mentioned property may be fulfilled. For that purpose, what is necessary is just to adjust the class of other resin mixed to the rate of crystalline block parts, such as a meso pentad molar fraction (mmmm) and a racemo pentad molar fraction (rrrr), the propylene, class and rate of the component to copolymerize, and it etc. Since it may be difficult to reconcile E' and $\tan \delta$ only of the (A) component although it is necessary to choose a thing suitable as the aforementioned (A) component in order to consider as above-mentioned [the viscoelastic property of the film of this invention] within the limits, it is practical to carry out to mix the ingredient of others [**** / carrying out the laminating of the layer of other ingredients] etc., and to adjust the property.

[0020] While adjusting the viscoelastic property of a film by mentioning non-chlorine-based ingredient layers, such as polyolefine system resin and a flexible styrene-butadiene system elastomer, as other resin layers, and carrying out the laminating of these in the case of a laminating, the tractive characteristics of a film are improved, and moderate reinforcement and elongation come to be shown, and the elongation in low temperature is improved. Here, especially as a charge of a laminated wood, polyolefine system resin is suitable from the field of grant of a surface characteristic or economical efficiency, and use of low density polyethylene, super-low density polyethylene (copolymer of ethylene and an alpha olefin), an ethylene-vinylacetate copolymer (EVA), an ethylene-alkyl acrylate copolymer, an ethylene-alkyl methacrylate copolymer, an ethylene-acrylic-acid copolymer, an ethylene-methacrylic-acid copolymer, ionomer resin, a propylene system elastomeric material, etc. is recommended.

[0021] Above-mentioned EVA can be used suitably practically, for example, and the thing for 0.2–5g / 10 minutes (JISK7210, 190 degrees C, 2.16kg load) is preferably suitable for a melt flow

rate (MFR) for a vinyl acetate content ten to 20% of the weight five to 25% of the weight as this EVA. The film with which a vinyl acetate content is obtained at less than 5 % of the weight is hard here, and flexibility and elastic recovery nature fall, and it is hard to discover surface adhesiveness. On the other hand, if 25 % of the weight is exceeded, surface adhesiveness will be too strong, it will begin to wind, and a sex and an appearance will tend to fall. Moreover, since film production stability will fall and it will become easy to produce a fall, variation, etc. of thickness spots or dynamics reinforcement if extrusion nature falls and MFR, on the other hand, exceeds 5g / 10 minutes in 0.2g / less than 10 minutes, it is not desirable.

[0022] Moreover, when mixing other ingredients, it is desirable to mix (B) petroleum resin, terpene resin, coumarone-indene resin, rosin system resin, or those hydrogenation derivatives.

(B) Since glass transition temperature of a component is high, it can raise the glass transition temperature of mixture. It is effective in reconciling the loss tangent ($\tan\delta$) which shows the storage modulus (E') which shows an extensibility suitable as a stretch film in ordinary temperature by this, and moderate stress relaxation nature.

[0023] As petroleum resin, it is a cyclopentadiene or the alicyclic petroleum resin from the dimer, and C9 among the (B) components here. There is aromatic series petroleum resin from a component, and the esterification rosin resin to which terpene resin and terpene-phenol resin from beta-pinene denaturalized with rosin resin, such as gum rosin and wood rosin, a glycerol, pentaerythritol, etc. as rosin system resin again can be illustrated as terpene resin. Although it is known that comparatively good compatibility is shown when the above-mentioned (B) component is mixed for the aforementioned (A) component etc., it is desirable to use a hydrogenation derivative from a color tone, thermal stability, and compatibility. In addition, although that in which the (B) component mainly has various glass transition temperature with molecular weight is obtained, 50-100 degrees C of glass transition temperature of this invention being suited are a 70-90-degree C thing preferably. When it mixes that glass transition temperature is less than 50 degrees C with the above-mentioned (A) component, in order to acquire desired viscoelastic property, it is necessary to make it contain so much, and it is easy to cause blocking of the ingredient by the bleeding to a front face, or a film. Moreover, it may become a problem practically that a mechanical strength is insufficient as the whole film, and it is easy to be torn. On the other hand, in that by which glass transition temperature exceeds 100 degrees C, compatibility with the (A) component may get worse, bleeding may be carried out to a film front face with time, and blocking and the fall of transparency may be caused.

[0024] Little way of a content is [the above-mentioned reason to the (B) component] desirable within limits which can attain the above-mentioned viscoelastic property. Since the elasticity polypropylene resin which had the stereoregularity applied to this invention controlled by this point has the glass transition temperature of about -10 degrees C or more, it acts on the propylene used ordinarily conventionally effective in the content of the (B) component adjusting even about 20 or less % of the weight of a small addition to desired viscoelastic property as compared with the low crystallinity polypropylene resin which the alpha olefin etc. contained so much. In the film of this invention, besides the (B) component mentioned above, the main point of this invention is not exceeded, and it is the range which does not worsen the appearance of a film and the following polyolefine system resin and styrene system elastomers which are usually used for a polyolefine system constituent can be blended.

[0025] for example, a copolymer (a propylene-ethylene copolymer --) with other monomers in which the homopolymer of a propylene or a propylene, and copolymerization are possible in a polypropylene resin a propylene-ethylene-alpha olefin copolymer etc. -- etc. -- by polyethylene system resin An ethylene-vinylacetate copolymer (a vinyl acetate content is 5 - 40 % of the weight), The carbon number of low density polyethylene and an alpha olefin The ethylene-alpha olefin copolymer of 4-8, An ethylene-acrylic-acid copolymer (an acrylic-acid content is 5 - 20 % of the weight), An alpha olefin and acrylic acids, such as an ethylene-methyl-methacrylate copolymer, ethylene, and a propylene, By the styrene system elastomer, the metal salt of a copolymer with the monomer chosen from the methacrylic acid, the maleic acid, etc. (Zn, Na, K, Li, Mg, etc.) A styrene-butadiene block copolymer or its hydrogenation derivative, the hydrogenation derivative of a styrene-butadiene random copolymer, the hydrogenation derivative

of a styrene-isoprene block copolymer, etc. are mentioned.

[0026] These can blend preferably one sort or two sorts or more with the improvement list of package fitness, such as the cut nature of a film, and a low-temperature property, one to 40% of the weight less than 50% of the weight for the purpose of improvement in economical efficiency. in addition, the range where the thickness of this invention film is generally used as a usual object for stretch packaging -- that is, about 8-30 micrometers are in the range of about 10-20 micrometers typically. Moreover, when considering as a laminated film, it is 0.4-0.8 preferably and 0.3 to 0.9 and that it is specifically 5-20 micrometers have a ratio desirable [the thickness of the layer which uses as a principal component the (A) component mentioned above] to the whole thickness from the field of many properties as a stretch film, and economical efficiency.

[0027] this invention film is obtained by fabricating an ingredient in the shape of a film with melting extrusion, inflation molding, or T-die shaping from an extruder. When considering as a laminated film, co-extruding with a multilayer die is advantageous. It is desirable that carry out melting extrusion of the ingredient resin, and it carries out inflation molding from an annular die practical, as for the blow up ratio in that case (the diameter of a bubble / diameter of a die), four or more are desirable, and especially the range of 5-7 is suitable for it. Whichever of the approach of cooling from both sides of an inside as the cooling approach in that case outside the approach and tube which are cooled from the external surface of a tube is sufficient.

Furthermore, the film obtained here is heated below to the crystallization temperature of resin, and using the speed difference between nip rolls, it extends 1.2 to 5 times to the lengthwise direction of a film, or you may increase biaxial stretching 1.2 to 5 times in the both directions of a film in every direction.

[0028] In order to give engine performance, such as fog resistance, antistatic nature, slipping nature, and self-adhesiveness, to the film of this invention, the various following additives can be suitably blended with the layer which uses a surface layer and/or the (A) component as a principal component. for example, a carbon number -- 1-12 -- with the fatty alcohol of 1-6 preferably A carbon number on 10-22, the fatty alcohol system fatty acid ester that is a compound with the fatty acid of 12-18 preferably, and a concrete target Mono-glycerol olate, polyglycerin olate, glycerol triricinolate, Glycerol acetyl triricinolate, polyglycerin stearate, polyglycerin laurate, Methyl acetyl triricinolate, ethyl acetyl triricinolate, butyl acetyl triricinolate, Propylene glycol olate, propylene glycol laurate, Pentaerythritol olate, polyethylene-glycol olate, Polypropylene-glycol olate, sorbitan olate, sorbitan laurate, On polyalkylene ether polyol and a concrete target, polyethylene-glycol sorbitan olate, polyethylene-glycol sorbitan laurate, etc. It is desirable 0.1 - 12 weight section and to carry out 1-8 weight section combination of at least one sort of the compound chosen from paraffin series oil etc. suitably further to the resinous principle 100 weight section which constitutes each class, such as a polyethylene glycol and a polypropylene glycol.

[Translation done.]

* NOTICES *

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- 2.**** shows the word which can not be translated.
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EXAMPLE

[Example] Hereafter, although an example explains this invention in more detail, this invention does not receive a limit at all by these. In addition, the various measured value about a film and evaluation which are displayed into this specification were performed as follows. Here, the direction of taking over from the extruder of a film (flow direction) is called a lengthwise direction, and the rectangular direction is called a longitudinal direction.

[0030] (1) Using E' and tandelta Iwamoto Factory viscoelasticity spectrometer VES-F3, by part for oscillation frequency [of 10Hz], and programming-rate/of 1 degree C, it measured from -50 degrees C to 150 degrees C, and the temperature of 20 degrees C and the value in 0 degree C were displayed from the obtained data about the longitudinal direction of a film.

[0031] (2) Using the stretch film with a stretch packaging fitness width of face of 350mm, the form polystyrene tray (die length of 200mm, width of face of 130mm, height of 30mm) was packed with the automatic packer (ISHIDA-WminMK-II made from the Ishida ****), and it evaluated about the item shown in Table 3. Moreover, the hand packaging machine (diamond wrapper A-105 by Mitsubishi Plastics Industries, Ltd.) performed the package trial using the same film and the same tray.

[0032] (3) The stability of the bubble at the time of fabricating a film by the stability inflation manufacturing facility of film production was evaluated.

O -- [-- Film production is impossible.] Extremely stable O -- Stable ** -- A little unstable x

[0033] (4) Glass transition temperature (Tg), a melting out temperature (Tm) the PerkinElmer, Inc. make -- it asked using DSC-7 from the thermogram when carrying out the temperature up of the 10mg of the samples by part for heating rate/of 10 degrees C according to JIS-K7121.

[0034] (5) After carrying out the temperature up of the 10mg of the samples to 200 degrees C after crystal fusion by part for heating rate/of 10 degrees C and holding them for 5 minutes at 200 degrees C according to JIS-K7121 and JIS-K7122 using 7, it asked from the thermogram when lowering the temperature to a room temperature by part for DSC[by amount PerkinElmer, Inc. of crystallization (temperature T_c) heat of crystallization]-cooling rate/of 10 degrees C.

[0035] (6) Melt flow rate (MFR)

According to JIS-K7210, it measured on condition that the test temperature of 230 degrees C, and test load 2.16kgf.

[0036] (7) A meso pentad molar fraction (mmmm), a racemo pentad molar fraction (rrrr)

It measured the following condition using JNM-GSX -270 (13C-nuclear-magnetic-resonance frequency of 67.8MHz) by JEOL Co., Ltd.

measurement mode: 1H-perfect decoupling pulse width: -- 8.6-microsecond pulse repetition-
time: -- count of 30-second addition: -- 7200 times solvent: -- mixed solvent (80/20 capacity
%) of an alt.dichlorobenzene / heavy benzene

sample concentration: -- 100mg / 1ml solvent measurement temperature: -- it asked for 130 degrees C of each pentad molar fractions here by measurement of the fission peak in the methyl group field of a ^{13}C -nuclear-magnetic-resonance spectrum. Moreover, attribution of the signal of a methyl group field is A.Zambelli. et It was based on al (8 Macromolecules 687 (1975)).

[0037] (8) the roll of an aging profit **** film was kept for ten days to the thermostatic chamber

of the conditions of the temperature of 50 degrees C, and 60% of relative humidity, it rolled back with the subsequent surface state, and the sex was evaluated.

O -- There is neither bleeding of the additive to a front face nor blocking of films.

O -- Although there is almost no bleeding of the additive to a front face, it has a little blocking of films.

** -- Slight bleeding of the additive to a front face occurs, and exfoliation is also a little heavy by blocking of films.

x -- There is much bleeding of the additive to a front face, and blocking of films cannot be used practically severely, either.

[0038] (Example 1) Let the elasticity polypropylene resin (I) by which stereoregularity was controlled, and ($T_m=155$ degree C, the product made from Huntsman Polymer Corporation, and "REXflex W101") be interlayers for propylene content:100-mol %, mmmm=35.3%, rrrr=15.4%, and MFR =16g /, and 10 minutes. Co-extrusion inflation molding of the layer of the constituent which carried out melting kneading of the diglycerol mono-olate 3.0 weight section as an antifogger at the EVA(15 % of the weight [of vinyl acetate contents], 190-degree-C, 10 MFR=2.0g /, minutes in 2.16kg load) 100 weight section be carried out to 11 micrometers in thickness and both sides of those by the three layer die temperature of 190 degrees C of annular, and blow up ratio 5.5 so that it might be respectively set to 2 micrometers, and the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) be obtained.

[0039] In addition, the property which measured the film which consists of this elasticity polypropylene resin (I) simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 5.4×10^9 dyn/cm² 20 degree C (E') Loss tangent in 4.8×10^8 dyn/cm² 20 degree C ($\tan \delta$) 0.34 glass transition temperature (T_g) The amount of -6-degree-C heat of crystallization 25 J/g crystallization temperature (T_c) 99 degrees C [0040] (Example 2) In the example 1, the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1

except having used 20% of the weight of the mixed constituent for the hydrogenation derivative of cyclopentadiene system petroleum resin of 125 degrees C of softening temperatures (glass transition temperature of 81 degrees C) to elasticity polypropylene resin (I) 80% of the weight as a raw material for interlayers.

[0041] In addition, the property which measured the film which consists only of mixture of the above-mentioned elasticity polypropylene resin (I) and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 1.9×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 1.4×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.59 glass transition temperature (T_g) 2 degrees C [0042] (Example 3) Set in the example 2. It replaced with the elasticity polypropylene resin (I), and the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used an elasticity polypropylene resin (II) and ($T_m=158$ degree C, the product made from Huntsman Polymer Corporation, and "REXflex W110") for propylene content:100-mol %, mmmm=44.5%, rrrr=12.3%, and MFR =6g / and 10 minutes.

[0043] In addition, the property which measured the film which consists of an above-mentioned elasticity polypropylene resin (II) simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 1.1×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 1.5×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.25 glass transition temperature (T_g) The amount of -7-degree-C heat of crystallization 35 J/g crystallization temperature (T_c) 102 degrees C [0044] Moreover, the property which measured the film which consists only of mixture of the above-mentioned elasticity polypropylene resin (II) and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 1.8×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 2.6×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.49 glass transition temperature (T_g) 5 degrees C [0045] (Example 4) Set in the example 1. the elasticity polypropylene resin (III)

(propylene content: -- 97-mol % --) by which stereoregularity was controlled as a raw material for interlayers Ethylene content : Three-mol %, mmmm=37.4%, rrrr=11.4%, MFR=19g /, 10 minutes.

Storage modulus in 0 degree C (E') Storage modulus in 1.8×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 2.6×10^9 dyn/cm² 20 degree C ($\tan \delta$) 0.49 glass transition temperature (T_g) 5 degrees C [0045] (Example 4) Set in the example 1. the elasticity polypropylene resin (III) (propylene content: -- 97-mol % --) by which stereoregularity was controlled as a raw material for interlayers Ethylene content : Three-mol %, mmmm=37.4%, rrrr=11.4%, MFR=19g /, 10 minutes.

Tm=149 degree C, Huntsman Polymer The product made from Corporation, "REXflex W201" The film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used 15% of the weight of the mixed constituent for the hydrogenation petroleum resin used to 85% of the weight in the example 2. [0046] In addition, the property which measured the film which consists of an elasticity polypropylene resin (III) simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 2.9×10^9 dyn/cm² 20 degree C (E') Loss tangent in 4.3×10^8 dyn/cm² 20 degree C ($\tan \delta$) 0.26 glass transition temperature (T_g) The amount of -10-degree-C heat of crystallization 21 J/g crystallization temperature (T_c) 95 degrees C [0047] Moreover, the property which measured the film which consists only of mixture of the above-mentioned elasticity polypropylene resin (III) and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 9.2x10⁹ dyn/cm² 20 degree C (E') Loss tangent in 6.2x10⁸ dyn/cm² 20 degree C (tan delta) 0.52 glass transition temperature (T_g) -2 degree C [0048] (Example 5) The film with a thickness [total] of 15 micrometers (4 micrometers / 7 micrometers / 4 micrometers) was obtained like the example 1 except having changed the laminating thickness ratio of an interlayer and a front lining as follows in the example 4.

[0049] (Example 1 of a comparison) Set in the example 1. as the raw material for interlayers -- an elasticity polypropylene resin (I) -- replacing with -- a low crystallinity propylene-ethylene-propylene copolymer elastomer (propylene content: -- 88-mol % --) The film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used Tm=156 degree C, Tokuyama Make, and P.E.R.T310J (henceforth "PER") for MFR=1.5g /, and 10 minutes.

[0050] In addition, the property which measured the film which consists of the above-mentioned PER simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 3.6x10⁹ dyn/cm² 20 degree C (E') Loss tangent in 2.1x10⁹ dyn/cm² 20 degree C (tan delta) 0.07 glass transition temperature (T_g) The amount of -25-degree-C heat of crystallization 31 J/g crystallization temperature (T_c) 101 degrees C [0051] (Example 2 of a comparison) Set in the example 1. as the raw material for interlayers -- an elasticity polypropylene resin (I) -- replacing with -- an elasticity polypropylene resin (IV) (propylene content: -- 100-mol % --) mmmm=63.0%, rrrr=8.0%, and MFR=2g /, 10 minutes, T_m=158 degree C, Huntsman Polymer The film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used the product made from Corporation, and "REXflex W105."

[0052] In addition, the property which measured the film which consists of an above-mentioned elasticity polypropylene resin (IV) simple substance was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 1.6x10¹⁰ dyn/cm² 20 degree C (E') Loss tangent in 3.7x10⁹ dyn/cm² 20 degree C (tan delta) 0.14 glass transition temperature (Tg) The amount of -6-degree-C heat of crystallization 54 J/g crystallization temperature (Tc) 108 degrees C [0053] (Example 3 of a comparison) In the example 2, the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 2 except having used PER which replaced with the elasticity polypropylene resin (I) and was used in the example 1 of a comparison.

[0054] In addition, the property which measured the film which consists only of mixture of PER and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 4.8x10⁹ dyn/cm² 20 degree C (E') Loss tangent in 1.2x10⁹ dyn/cm² 20 degree C (tan delta) 0.23 glass transition temperature (Tg) -16 degree C [0055] (Example 4 of a comparison) In the example 1, the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 1 except having used 30% of the weight of the mixed constituent for the hydrogenation petroleum resin used for 70 % of the weight of PER used in the example 1 of a comparison as a raw material for interlayers in the example 2.

[0056] In addition, the property which measured the film which consists only of mixture of PER

and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 9.0×10^9 dyn/cm² 20 degree C (E') Loss tangent in 2.0×10^9 dyn/cm² 20 degree C (tan δ) 0.35 glass transition temperature (Tg) -7 degree C [0057] (Example 5 of a comparison) In the example 2, the film with a thickness [total] of 15 micrometers (2 micrometers / 11 micrometers / 2 micrometers) was obtained like the example 2 except having replaced with the elasticity polypropylene resin (I) and having used the elasticity polypropylene resin (IV).

[0058] In addition, the property which measured the film which consists only of mixture of an elasticity polypropylene resin (IV) and hydrogenation petroleum resin was as follows.

Storage modulus in 0 degree C (E') Storage modulus in 2.2×10^{10} dyn/cm² 20 degree C (E') Loss tangent in 6.5×10^9 dyn/cm² 20 degree C (tan δ) 0.26 glass transition temperature (Tg) 6 degrees C [0059] (Example 6 of a comparison) It evaluated about the commercial polyvinyl chloride stretch film (15 micrometers in thickness). About the above-mentioned example 1 thru/or 5 and the example 1 of a comparison thru/or 6, the measured value of the viscoelastic property of each laminated film (the example 6 of a comparison is a monolayer) etc. was shown in Table 1, and evaluation of stretch packaging proper ** was shown in Table 2.

[0060]

[Table 1]

表 1

	20°C		0°C	製膜 安定性
	E'	tan δ	E'	
実施例 1	8.6×10^8	0.27	5.2×10^9	○
実施例 2	1.4×10^9	0.47	1.3×10^{10}	○
実施例 3	2.3×10^9	0.43	1.4×10^{10}	◎
実施例 4	7.6×10^8	0.36	8.1×10^9	○
実施例 5	8.9×10^8	0.25	6.0×10^9	◎
比較例 1	1.8×10^9	0.07	3.3×10^9	◎
比較例 2	3.0×10^9	0.14	1.2×10^{10}	◎
比較例 3	1.2×10^9	0.17	4.1×10^9	○
比較例 4	1.7×10^9	0.26	6.5×10^9	△
比較例 5	5.1×10^9	0.25	1.7×10^{10}	○
比較例 6	1.9×10^9	0.35	5.5×10^9	—

[Table 2]

表 3

		評価方法	評価基準			
			×	△	○	◎
手 包 装	シ フ	特にシワの発生し 易いトレコーナ ー部を評価	大きなシワ が発生する	少し シワがある	僅かに シワがある	全く シワがない
	耐 破 れ	特に破れの発生し 易いトレコーナ ー部における破れ 易さを評価	非常に 破れ易い	やや 破れ易い	時々破れる ことがある	ほとん ど破れ ない
自 動 機	カ ッ ト 搬 送 性	カット時の切断面 のカーブや、搬送 時のチャック状態 を評価	カット搬送 が出来ない	やや 問題あり	まあまあで ある	全く 問題ない
	仕 上 り 適性	包装条件（張りの 強さ）を25水準に 変え包装仕上がり の良好な水準数率 を評価	0/25 ～ 3/25	4/25 ～ 10/25	11/25 ～ 15/25	16/25 ～ 25/25
共 通	底シール 性	熱板温度100℃と し、包装後のシー ル状態を評価	熱による穴 があったり、 割がれ易い	やや割がれ 生ずる	僅かに割が れ生ずる	通常の取扱 いでは割が れない
	復 元 性	バック品の中央部 を指で底まで押し た後の指の押跡の 状況の評価	完全に 押跡が残る	かなり 押跡が残る	僅かに 押跡が残る	完全に 復元する
	フィルムの 張り	バック品の上面を 手で押さえた時の 反発性や積み重ね 時のたるみを評価	張りが弱す ぎてたより なく、たる みも生じる	かなり張り が弱い	やや張りが 弱い	張りが良く 反発性も 良い
	低温特性	5℃の環境で包装 したときの破れ易 さやトレーの变形 を評価	フィルム破 れが生じト レーも变形 する	フィルム破 れやトレー の变形が生 じやすい	フィルム破 れやトレー の变形が 時々生ずる	問題ない

[0061] It turns out that each of examples 1 in the range which viscoelastic property specifies by this invention from Table 1 thru/or 3 using the resin specified by this invention thru/or films of 5 is synthetically excellent in many properties as a stretch film. On the other hand, it turns out that the example 1 of a comparison thru/or the film of 5 out of range which resin differs or viscoelastic property specifies by this invention is inferior to the synthetic property as a stretch film.

[0062]

[Translation done.]

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